28033

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date · February 2, 1994

From Senior Regional Representative
ATSDR, Region III

Subject Public Health Assessment
North Penn-Area 1

To Greg Ham, Remedial Project Manager
EPA, Region III

Attached is the Public Health Assessment on North Penn-Area 1, Souderton, Montgomery County, Pennsylvania. This Public Health Assessment prepared by the Pennsylvania Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry, represents an evaluation of the relevant health and environmental data and community concerns that have been collected on this site.

If after review, you or your staff have questions or comments, please contact our office at (215)597-7291.

Charles J. Walters, Jr.

Attachment

cc: Max Howie, ATSDR/DHAC/RIMB
Amy Barnett, EPA CRC
Bruce Beitler, PADER
Gary Gurian, MCHD
Kandiah Sivarajah, PADOH

AR301281A

Public Health Assessment for

NORTH PENN-AREA 1

SOUDERTON, MONTGOMERY COUNTY, PENNSYLVANIA

CERCLIS NO. PAD096834494

JANUARY 12, 1994

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104 (i) (6) (F) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risks assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

PUBLIC HEALTH ASSESSMENT

NORTH PENN-AREA 1

SOUDERTON, MONTGOMERY COUNTY, PENNSYLVANIA

CERCLIS NO. PAD096834494

Prepared By:

Pennsylvania Department of Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations 42 C.F.R. Part 90). In preparing this document ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

Agency for Toxic Substances and Disease Registry.....*William L. Roper, M.D., M.P.H. Administrator*
Barry L. Johnson, Ph.D., Assistant Administrator

Division of Health Assessment and Consultation.....*Robert C. Williams, P.E., Director*
Juan J. Reyes, Deputy Director

Federal Programs Branch.....*Sally L. Shaver, Chief*

Community Health Branch.....*Cynthia M. Harris, Ph.D., Chief*

Remedial Programs Branch.....*Sharon Williams-Fleetwood, Ph.D., Chief*

Records & Information Management Branch.....*Max M. Howie, Jr., Chief*

Emergency Response & Consultation Branch.....*C. Harold Emmett, P.E., Chief*

Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services

Additional copies of this report are available from:
National Technical Information Service, Springfield, VA
(703) 487-4650

ATSDR and its Public Health Assessment

ATSDR is the Agency for Toxic Substances and Disease Registry, a federal public health agency. ATSDR is part of the Public Health Service in the U.S. Department of Health and Human Services. ATSDR is not a regulatory agency. Created by Superfund legislation in 1980, ATSDR's mission is to **prevent or mitigate adverse human health effects and diminished quality of life resulting from exposure to hazardous substances in the environment.**

The Superfund legislation directs ATSDR to undertake actions related to public health. One of these actions is to prepare public health assessments for all sites on or proposed for the Environmental Protection Agency's National Priorities List, including sites owned or operated by the federal government.

During ATSDR assessment process the author reviews available information on

- the levels (or concentrations) of the contaminants,
- how people are or might be exposed to the contaminants, and
- how exposure to the contaminants might affect people's health

to decide whether working or living nearby might affect peoples' health, and whether there are physical dangers to people, such as abandoned mine shafts, unsafe buildings, or other hazards.

Four types of information are used in an ATSDR assessment.

1) **environmental data;** information on the contaminants and how people could come in contact with them

2) **demographic data;** information on the ethnicity, socioeconomic status, age, and gender of people living around the site,

3) **community health concerns;** reports from the public about how the site affects their health or quality of life

4) **health data;** information on community-wide rates of illness, disease, and death compared with national and state rates

The sources of this information include the Environmental Protection Agency (EPA) and other federal agencies, state, and local environmental and health agencies, other institutions, organizations, or individuals, and people living around and working at the site and their representatives.

ATSDR health assessors visit the site to see what it is like, how it is used, whether people can walk onto the site, and who lives around the site. Throughout the assessment process, ATSDR health assessors meet with people working at and living around the site to discuss with them their health concerns or symptoms.

A team of ATSDR staff recommend actions based on the information available that will protect the health of the people living around the site. When actions are recommended, ATSDR works with other federal and state agencies to carry out those actions.

A public health action plan is part of the assessment. This plan describes the actions ATSDR and others will take at and around the site to prevent or stop exposure to site contaminants that could harm peoples' health. ATSDR may recommend public health actions that include these:

- restricting access to the site,
- monitoring,
- surveillance, registries, or health studies,
- environmental health education, and
- applied substance-specific research.

ATSDR shares its initial release of the assessment with EPA, other federal departments and agencies, and the state health department to ensure that it is clear, complete, and accurate. After addressing the comments on that release, **ATSDR releases the assessment to the general public.** ATSDR notifies the public through the media that the assessment is available at nearby libraries, the city hall, or another convenient place. Based on comments from the public, ATSDR may revise the assessment. ATSDR then releases the final assessment. That release includes in an appendix ATSDR's written response to the public's comments.

If conditions change at the site, or if new information or data become available after the assessment is completed, ATSDR will review the new information and determine what, if any, other public health action is needed.

For more information about ATSDR's assessment process and related programs please write to:

Director
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry
1600 Clifton Road (E-32)
Atlanta, Georgia 30333

TABLE OF CONTENTS

SUMMARY

The North Penn Area 1 site, a National Priorities List (NPL) site, is located in the Borough of Souderton, Montgomery County, Pennsylvania. The North Penn Area 1 site is one of six NPL sites that involve the North Penn Water Authority (NPWA) wells that supply drinking water to people living northwest of Philadelphia. Gentle Cleaners, Inc., one of the parties potentially responsible for the site contamination, has been in business since 1953 and used tetrachloroethene (PCE) from 1953 to 1983 in dry cleaning operations. A PCE spill of 75 gallons was documented in the early 1970s. Very close to the Gentle Cleaners is the Granite Knitting Mills, a hosiery mill that has operated for over 50 years. This facility also used PCE as part of its dry cleaning operations. In 1979, NPWA discovered PCE in municipal well S-9 in the area and took the well out of service. The NPWA serves over 65,000 people in ten municipalities. Approximately 8,000 people live within 1 mile of the site. The site is 800 feet northwest of Skippack Creek, which is used for recreational activities.

At present, groundwater is the only medium that is known to be contaminated. Environmental data for surface soil, surface water, sediment, and air do not exist. Past, present, and future completed exposure pathways for volatile organic compounds such as PCE and TCE in groundwater exist for nearby residents. The site is considered an indeterminate public health hazard because limited data are available; however, data that are available do not indicate that humans are being or have been exposed to levels of contaminants that would be expected to cause any adverse health effects.

The evaluation of health outcome data was negative, and there were no specific concerns from the citizens regarding morbidity and mortality. There was limited concern about possible health effects from past exposure to contaminated drinking water.

The data and information developed in the North Penn Area 1 Public Health Assessment have been evaluated for appropriate follow-up actions. The Agency for Toxic Substances and Disease Registry's (ATSDR) Health Activities Recommendation Panel (HARP) determined that no follow-up public health actions are necessary. ATSDR will reevaluate this site and conduct appropriate public health actions if new data become available that indicate a need to do so.

The Pennsylvania Department of Health (PADOH) will review the findings of the North Penn Area 1 Phase II Remedial Investigation Report. This report should better characterize the site by defining the extent of contamination and determining if there is any public health risk from surface water, soil, sediment, and air pathways.

As other information become available on the status of recommendations made in this public health assessment, ATSDR and PADOH will evaluate that information to determine if conditions have changed at the site and if other follow-up actions are necessary.

BACKGROUND

A. Site Description and History

North Penn Area 1 is within the Borough of Souderton in Montgomery County. The site is one of six proposed or final NPL sites within the North Penn Water Authority (NPWA) service district in Montgomery County, Pennsylvania (Figure 1). Previous investigations by the NPWA, the Pennsylvania Department of Environmental Resources (PADER), and the U.S. Environmental Protection Agency (EPA) Region III detected elevated levels of volatile organic compounds (VOCs) in groundwater samples from wells at each of the sites. The primary contaminants identified to date have been trichloroethene (TCE), tetrachloroethene (PCE), and 1,1-dichloroethene (1).

This public health assessment will pertain only to North Penn - Area 1. Three potentially responsible parties (PRPs) were initially identified: Gentle Cleaners, Inc., Granite Knitting Mills, Inc., and Parkside Apartments. These PRPs are located near the center of the town and are all within a half-mile radius of two municipal wells, S-9 and S-10, which are owned by the NPWA; well S-9 is not currently being operated due to contamination by PCE. Figure 2 indicates the three PRPs and existing well locations. However, based on a PRP search conducted by EPA in 1989, the following additional two facilities were added to the PRP list for Area 1: Lexco Engineering and Standard Terry Mills (2). For the purpose of this public health assessment, on-site will be defined as the area revised in 1991 to include the five PRPs as shown in Figure 3. A brief description and history of the PRPs follow.

Gentle Cleaners' operation began before 1953. Between 1953 and 1983, the company used 70 to 100 gallons of PCE per month as well as less than 1 gallon per month of spotting chemicals containing 1,1,1-trichloroethane and other chlorinated solvents of unknown composition. Since 1983, the volume of PCE used has been reduced to about 50 gallons per month. The PCE was stored onsite in either an above-ground storage tank or drums. An underground storage tank may also have been used to store PCE. A spill of 75 gallons of PCE was documented in the early 1970s. PCE flowed out the rear door onto the grassed area behind the building. Also, discharge of PCE to a sink that drained into the same grassed area may have contributed to soil contamination (1).

Granite Knitting Mills operated a knitting mill before the early 1960s. From 1967 to 1979, a dry cleaning machine using PCE was maintained at the facility. Use of the machine may have stopped before 1979. PCE for the machine was stored in a tank inside the building. Wastes generated from the machine were estimated to contain about 2 percent PCE and were stored in drums on the southwest side of the building (1).

The Parkside Apartments property once included a dry cleaning establishment. Before that, the property was used as a beer distributor, and prior to that as a slaughter house. Three underground storage tanks containing petroleum hydrocarbon fuels were once located on the

property, but were removed around 1980. There may be additional underground storage tanks still on the property, as evidenced by the presence of an inlet at the south corner of the building (1). The Parkside Apartments contain eight units and have been available for occupancy since 1975. The Apartment occupants obtain their water from the North Penn Water Authority.

Lexco Engineering has been at its current location for about 30 years and uses organic solvents, including kerosene and 1,1,1-trichloroethane, in the manufacturing of hydraulic lifts. The facility has two underground storage tanks, one containing heating oil and the other, unused for years, appears to still contain gasoline (1). Eleven people were employed by Lexco in 1990 (3).

Standard Terry Mills at one time consisted of a knitting mill operation and may have been a dry cleaners. Several holes in the pavement southwest of the building indicate that underground storage tanks may have been located there and have subsequently been removed (1). A fire in May of 1991 destroyed the building and only a concrete foundation remained at the time of the site visit. Eighty-one persons were employed by Standard Terry Mills in 1990. Products manufactured included kitchen and tabletop textiles, towels, pot holders, oven mitts, kitchen cloths, place mats, napkins, and seat pads (3).

Groundwater sampling was initiated at wells S-9 and S-10 in 1979 when the NPWA discovered PCE contamination in well S-9. Pumping of well S-9 was discontinued at that time. In July 1986, NUS Corporation completed a site discovery for EPA, and in August 1986, a NUS Field Investigation Team (FIT III) sampled residential wells. The site was proposed for the NPL in January 1987 and made final on March 31, 1989. In June 1988, ATSDR issued a preliminary public health assessment for the site. This report concluded that a thorough survey of wells used in the area was necessary along with an alternate water supply for any contaminated private wells.

The Preliminary Boundary of Area 1 (1986) and the revised boundary of Area 1 (1991) are shown on Figure 3. The location of North Penn Area 1 in relation to other North Penn Area sites is shown on Figure 1. Residences are in close proximity to the PRPs and, in the case of the Parkside Apartments, these served as residences. A promised well survey by CH2M Hill and ensuing Remedial Investigation/Feasibility Study (RI/FS) should provide answers to the nature and extent of contamination in the area.

B. Site Visit

Mr. Thomas Hartman and Mr. Robert M. Stroman of PADOH, Mr. Charles Walters of ATSDR, a representative of EPA, and a representative of the Montgomery County Department of Health visited the site on November 19, 1991. The day was mild (65°F) and all visits were exterior observations. There were no visible signs of contamination. Standard Terry Mills, Inc., experienced a fire in May 1991 and the remains had been cleared down to the foundation. The other four areas were operable and no entry was deemed

necessary. Well S-9 was observed in close proximity to the Parkside Apartments. West Street Park, a public recreation facility, operated by the Department of Community Affairs was near Parkside Apartments and the location of well S-9. An unnamed stream runs through the West Street Park. The stream was low at this time but would be subject to rapid rise from runoff during heavy rains.

The EPA Remedial Project Manager (RPM) led the group on a driving tour in which we located North Penn Areas 2, 5, 6 and 7. This tour was informative and provided insight into the complex nature of the North Penn Water Authority and the large number of PRPs subject to investigation (Figure 1).

As of December 23, 1993, no physical changes had occurred at the site. Well S-9 remains out of service.

C. Demographics, Land Use, and Natural Resource Use

Demographics

Souderton Borough is on the northeastern border of Montgomery County adjacent to Bucks County. Telford Borough joins Souderton Borough to the north and Franconia Township lies to the south. Souderton Borough had a 1980 census population of 6,657 and a 1990 census population of 5,957. This is a decline in population of 10.5 percent, whereas the population of Montgomery County increased by 5.4 percent from 643,371 to 678,111 in 1980 and 1990, respectively (4). Approximately 8,000 people live within 1 mile of the North Penn Area 1 site (1).

Montgomery County is a wealthy county with the median home value being $143,400 compared to $69,700 for Pennsylvania according to the 1990 census. Median rentals for the county are $521 a month compared to $322 a month for Pennsylvania. Souderton Borough had a median home value of $118,000 and a median rental of $446 (5).

The 1990 census indicates Souderton Borough had 16 percent of its population 65 and over compared to 15 percent for Montgomery County and 15.4 percent for Pennsylvania. Souderton Borough was 96.1 percent White and 2.7 percent Spanish origin in 1990 (5).

The Souderton Area School District had an enrollment of 4,920 students in the public school program K-12 for the 1990-91 school year. The public schools within Souderton Borough and their 1990-91 enrollment are as follows (6,7,8):

E.M. Crouthamel Elementary School	(353)
West Broad Street Elementary School	(434)
Indian Crest Middle School	(232)
Souderton Area High School	(1,291)

The Souderton Mennonite Home, a 59-bed nursing home, lies just beyond the Borough limits. There are no hospitals within 5 miles of Souderton Borough; however, Grand View Hospital, a 230-bed facility in Sellersville, Bucks County, and North Penn Hospital, a 150-bed facility in Lansdale, Montgomery County, are less than 10 miles from Souderton Borough (9,10).

Land Use

Souderton Borough is a residential, commercial, and industrial community. The 1990 Pennsylvania Industrial Directory indicates 36 businesses in Souderton Borough and 31 businesses in Telford Borough, an adjoining community. The 1991 Annual Report of the NPWA indicates the NPWA serves over 65,000 people in the Borough of Lansdale, Souderton and Hatfield, and the Townships of Franconia, Hatfield, Lower Salford, New Britain, Skippack, Towamencin and Worcester. The site is 800 feet northwest of Skippack Creek, which is used for recreational activities (11). There are areas of less dense population between communities; however, the area is generally commercial with only limited farming.

The area around the PRPs was residential and business. Single family homes in close proximity to one another line the street near Granite Knitting Mills. There are some multi-unit dwellings in the Souderton Borough area which are rental properties. However, all residences in the area of concern use the North Penn Water Authority as their source of potable water.

Natural Resource Use

The site is located in the Triassic Lowland Section of the Piedmont Physiographic Province (1). The topography of the area is gently rolling, with low-lying ridges and hills. The land and drainage in the vicinity of the site generally slopes to the southeast, toward the Delaware River. Most of the region around the site is drained by Skippack Creek and its tributaries. Skippack Creek then discharges into the Schuylkill River which ultimately discharges into the Delaware River.

An estimated 15 to 21 inches of precipitation enters the surface-water drainage system as surface runoff. In the vicinity of the site, it appears that the surface runoff probably moves southeastward toward the unnamed, intermittent tributary of Skippack Creek, although some runoff may be directed elsewhere by stormwater collection systems. When the water table is high, water entering this stream may flow southwestward and southward into Skippack Creek and thence to the Schuylkill and the Delaware Rivers. When the water table is low, the surface runoff may seep into dry stream beds and emerge at the surface farther downstream.

The residential wells sampled in Souderton Borough during the site investigation were all shallow, hand-dug wells. None of these wells were used as a source of potable water. A well survey just completed (1992) indicates that there are no residential wells used for drinking water at present in the area of perceived groundwater contamination. Only a few of the wells had active hand pumps and were used for watering plants and outdoor activity only (12). Presently, only five NPWA wells serve Souderton Borough, all of which are 300 feet deep with the exception of S-2 which is 216 feet deep.

The Granite Knitting Mills well and the Old Souderton Borough well served as monitoring points in the site investigation. The Granite Knitting Mills well served as a production well over a decade ago, but was taken out of service. The Souderton Borough well has been inactive as a source of drinking water for over 25 years (12).

D. Health Outcome Data

Using state health data bases, special studies, or other relevant health outcome data bases, it may be possible to determine whether certain health effects are higher than expected in areas surrounding hazardous waste sites. This section introduces these data bases and discusses their limitations. An evaluation of the usefulness of these health data as they relate to the North Penn Area 1 site is presented in the Public Health Implications section.

PADOH has maintained death records since 1903. The Pennsylvania Cancer Registry has collected cancer data for all areas of Pennsylvania since 1984. Field representatives interact with local hospitals to audit the accuracy of all reporting. However, the mobility of the patients, the variance in compliance rates among hospitals and the newness of the program create difficulty in analyses of geographic areas smaller than the county level. The most recent report, published in September 1991, is entitled *Cancer Incidence and Mortality in Pennsylvania, 1988*. The report only presents data applicable at the county level (smallest geographic area).

COMMUNITY HEALTH CONCERNS

PADOH is unaware of organized citizens action groups or widespread public health concern related to this site. The Remedial Program Manager (RPM) for EPA and the Borough Manager indicate that public concern about this NPL site is minimal at present. NPWA tests the water regularly (monthly testing normally) and the water meets drinking water standards. Contact with the citizens will be maintained by EPA and PADOH during the RI/FS investigation. There was some concern about adverse health effects from past exposure to contaminated water through the NPWA. This concern will be addressed in the Community Health Concerns Evaluation section.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

The tables in this section list the contaminants of concern. However, their listing does not imply that a health threat exists. This public health assessment evaluates these contaminants in subsequent sections and determines whether exposure to them has public health significance. PADOH selected these contaminants based upon the following factors: on- and off-site concentrations; field and laboratory data quality and sample design; comparison of site-related concentrations with background concentrations; and comparison of site-related concentrations with public health assessment comparison values for carcinogenic and noncarcinogenic endpoints. Comparison values for public health assessments are contaminant concentrations in specific media that are used to select contaminants for further evaluation. These values include Environment Media Evaluation Guides (EMEGs), Cancer Risk Evaluation Guides (CREGs), and other relevant guidelines.

In the data tables which follow under on-site contamination and off-site contamination subsections, the listed contaminant does not mean that it will cause adverse health effects from exposure. Instead, the list indicates which contaminants will be evaluated further in the public health assessment. When selected as a contaminant of concern in one medium, that contaminant will be reported in all media. The groundwater investigation of this site analyzed for only six VOCs (2). They were: 1,1,1-trichloroethane; 1,1-dichloroethane (1,1-DCA); 1,1-dichloroethene (1,1-DCE); and 1,2-DCE (cis, trans and total); PCE; and TCE.

The EPA Toxic Chemical Release Inventory data base was accessed by PADOH through the National Library of Medicine's Toxicology Data Network and searched for estimated annual release of toxic chemicals to the environment, from industries within a 2-mile radius of the North Penn Area 1 site, to identify possible facilities that could contribute to air or groundwater contamination near the site. No significant releases which would affect the air or groundwater quality near the site were reported in the 1987, 1988, and 1989 data bases.

North Penn Area 2 is an NPL site less than 2 miles east of North Penn Area 1. The site is now fenced and guarded 24 hours a day. Ametek, Inc. (PRP) took measures to clean up several areas of soil contamination in 1987. EPA conducted sampling of 16 residential wells located near the site in 1989; none of the wells sampled was found to be contaminated above drinking water standards. EPA has scheduled resampling of residential wells to determine whether there has been any change in water quality since the testing in 1989 (11).

A. On-Site Contamination

Groundwater - Granite Knitting Mills Well

On August 28, 1986, NUS Field Investigation Team (FIT) III obtained water samples and NPWA analyzed them. Figure 4 indicates the location where samples were collected, and Table 1 indicates the concentrations of contaminants of concern.

Table 1. Maximum Contaminant Concentrations in On-Site Well (Granite Knitting Mills)(1)

CONTAMINANT	MAXIMUM CONCENTRATION ug/L	COMPARISON VALUE	
		ug/L	Source
1,1-Dichloroethene	9.9	0.06	CREG
Tetrachloroethene	33.5	0.7	CREG
Trichloroethene	12.2	3.0	CREG

CREG - Cancer Risk Evaluation Guide
ug/L - Microgram Per Liter

Groundwater - North Penn Water Authority (NPWA)

On August 28, 1986, NUS FIT III obtained water samples and NPWA analyzed them. NPWA performed regular sampling from January 1985 through August 1987. All analysis was done by NPWA except for a sample taken in 1980 for which the laboratory was unknown. Figure 4 indicates the location where samples were collected, and Table 2 indicates the maximum concentration of contaminants.

Table 2. Maximum Contaminant Concentrations in On-Site Wells (North Penn Water Authority)(1,2)

CONTAMINANT	MAXIMUM CONCENTRATION μg/L	COMPARISON VALUE	
		μg/L	Source
1,1-Dichloroethene	1.0	0.06	CREG
Tetrachloroethene	24.7	0.7	CREG
Trichloroethene	1.0[b]	3.0	CREG

CREG - Cancer Risk Evaluation Guide
b - Estimated Result
μg/L - Microgram Per Liter

Groundwater - Residential Wells and Old Souderton Borough Well

As indicated in the Natural Resources Use section, the residential wells are shallow, hand-dug wells, served as monitoring points, and were not being used for potable water. The Old Souderton Borough Well, a deeper well, also served as a monitoring well for the site investigation.

On August 28, 1986, NUS FIT III collected a sample from nine residential wells. The residential wells were not purged. At the Old Souderton Borough Well (Well 679 in Figure 4), NUS took a sample before and after a two-hour purge. NPWA performed all analysis. Figure 4 indicates the location where samples were collected, and Table 3 indicates the maximum concentrations of contaminants.

Table 3. Maximum Contaminant Concentration in On-Site Residential Wells and Old Souderton Borough Well (1,2)

CONTAMINANT	MAXIMUM CONCENTRATION µg/L	COMPARISON VALUE	
		µg/L	Source
1,1-Dichloroethene	0.5[b]	0.06	CREG
Tetrachloroethene	14.1	0.7	CREG
Trichloroethene	5.0[a]	3.0	CREG

CREG - Cancer Risk Evaluation Guide
b - Estimated Result
a - Results from Souderton Borough Well after purge.
µg/L - Microgram Per Liter

B. Off-Site Contamination

Groundwater - North Penn Water Authority (NPWA)

March 1988 sampling did not reveal any contamination in sampling the NPWA well S-2. NPWA well S-4 showed PCE levels from 2.3 to 3.4 µg/L during the sampling period March to September 1988. NPWA wells are sampled monthly and analyzed by the NPWA. Figure 4 indicates the location where samples were collected, and Table 4 indicates the maximum concentrations of contaminants.

Table 4. Maximum Contaminant Concentrations in Off-Site Wells (North Penn Water Authority) (1,2)

CONTAMINANT	MAXIMUM CONCENTRATION µg/L	COMPARISON VALUE	
		µg/L	Source
1,1-Dichloroethene	ND	0.06	CREG
Tetrachloroethene	3.4	0.7	CREG
Trichloroethene	ND	3.0	CREG

CREG - Cancer Risk Evaluation Guide
ND - Not Detected
µg/L - Microgram Per Liter

Groundwater - Residential Wells

On August 28, 1986, NUS sampled two residential wells and NPWA analyzed the samples. These wells were shallow, hand-dug wells and were not used for potable water. Figure 4 indicates the location where samples were collected, and Table 5 indicates the maximum concentrations of contaminants.

Table 5. Maximum Contaminant Concentrations in Off-Site Residential Wells (1,2)

CONTAMINANT	MAXIMUM CONCENTRATION µg/L	COMPARISON VALUE	
		µg/L	Source
1,1-Dichloroethene	0.5[b]	0.06	CREG
Tetrachloroethene	0.5[b]	0.7	CREG
Trichloroethene	0.5[b]	3.0	CREG

CREG - Cancer Risk Evaluation Guide
µg/L - Microgram Per Liter
b - Estimated Result

C. Quality Assurance and Quality Control

CH2M Hill has been contracted by EPA to perform an RI/FS on North Penn Area 1. CH2M Hill has not ascertained the quality of the data used in this public health assessment. Samples taken on August 28, 1986, were collected by FIT III (NUS) and were analyzed by NPWA. All other samples were both collected and analyzed by NPWA.

QA/QC procedures reported to have been used by FIT III to maintain and monitor sample quality included the following:

(1) At the Souderton Borough Well (#679), samples were taken before and after a two-hour purge, and pH and conductivity were monitored during purging.

(2) At NPWA, wells S-9 and S-10 were purged for an unspecified length of time before collection.

(3) A field blank and a field duplicate were collected.

The private wells were not purged. A sample log was completed, but chain-of-custody forms are not in the record. Additional QA/QC procedures may have been implemented without being reported.

The NPWA sample collection and analysis procedures are documented in the QA manual. NPWA wells are generally sampled on a monthly basis. Sample collection QA procedures include specification for, but not documentation of, the following: sample containers, sample labels, preservatives, sample collection, and sample storage.

The QA manual requires that no headspace be allowed in the volatile organic analysis (VOA) vials and that the samples be stored on ice. Sample analysis QA procedures include specification for, but not documentation of, the following: (1) preparation of calibration standards and equipment calibration; (2) EPA quality control and performance evaluation samples; (3) sample documentation; (4) laboratory blanks; (5) laboratory duplications; (6) spiked samples; (7) holding times; and (8) corrective action.

The following assumptions regarding data quality were made on the basis of this QA/QC information:

(1) All data reported by the laboratories and organizations were used for RI/FS planning. This conclusion was based on the reputations of the laboratories and organizations and on the consistency and reproductivity of the data.

(2) No data have been successfully validated; therefore, none of the data can be used for [quantitative] risk assessment.

D. Physical and Other Hazards

No hazards were apparent at any of the five PRP locations.

PATHWAYS ANALYSES

To determine whether residents are exposed to contaminants migrating from the site, PADOH and ATSDR evaluate the environmental and human components that lead to human exposure. This pathways analysis consists of five elements: a source of contamination, transport through an environmental media, a point of exposure, a route of human exposure, and an exposed population.

PADOH and ATSDR identify exposure pathways as completed, potential or eliminated. In completed exposure pathways, the five elements exist and indicate that exposure to a contaminant has occurred in the past, is occurring, or will occur in the future. In potential exposure pathways, however, at least one of the five elements is missing, but could exist. Potential exposure pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring now, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present. The only known human exposure pathway at this site is through the use of groundwater. No data are available for surface water, soil, sediment, or air. Table 6 identifies the completed exposure pathways.

A. Completed Exposure Pathway

Public Water Supply Pathway

People have been exposed in the past, are currently exposed, and may be exposed in the future to contaminants present in NPWA water supply wells. Contamination of PCE was discovered in well S-9 in 1979. Pumping of well S-9 was discontinued at that time, and the blending of water from other wells reduces contamination levels to within drinking water standards.

Based on the information available, there appears to be a single plume of groundwater contamination affecting the Granite Knitting Mills well, NPWA wells, and possibly some residential wells at the site. However, existing water quality data from which the extent of

the plume was estimated by NUS were obtained from wells of undocumented construction; therefore, it is not possible at present to assess to what degree the data represent the actual plume distribution. There are no additional data on the vertical and horizontal extent and nature of contamination at the site, nor on rates of movement of either groundwater or contaminants (1).

Table 6. Completed Exposure Pathway

PATHWAY NAME	TIME	SOURCE	MEDIA & TRANSPORT	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POP.
Public Supply (North Penn Water Authority (NPWA)	Past Present Future	5 PRPs	Groundwater (Municipal Water)	Residences (Taps)	Ingestion Inhalation Dermal	5,000 Est.
Private Well	Past	5 PRPs	Groundwater (Private Well)	Residences (Outdoor Pump)	Ingestion Inhalation Dermal	A Small Number Est. Under 50

In 1979, elevated levels of PCE were found in NPWA well S-9. This well was used by NPWA to supply an undetermined but substantial number of people. Those people are exposed to contaminants through ingestion of the contaminated water, inhalation of the volatile organic compounds released when taps are turned on, and by direct skin contact with the contaminated water. PADOH does not know precisely when well S-9 became contaminated or the level of contamination at the tap since wells are blended. However, a spill of 75 gallons of PCE was documented at Gentle Cleaners in the early 1970s. This documentation states that PCE flowed out the rear door onto the grassed area behind the building (1).

Private Well Pathway

A recently completed well survey indicates that there are no residential wells in the area used for potable water. This area is served totally by the North Penn Water Authority. Only a few wells remain with hand pumps that can provide water for outdoor use. People who used the contaminated well water for watering plants or animals, were exposed to the contaminants through direct skin contact and through inhalation of the volatile organic compounds. Ingestion was not likely a route of exposure. Most of the hand-dug wells are

totally inactive and only served as monitoring points in field investigations. Little is known about prior use of the wells; however, NPWA has been in existence over 25 years, indicating that exposure to contamination through ingestion was most likely minimal from residential wells. Preliminary evidence is that this pathway can be eliminated in future considerations.

B. Potential Exposure Pathway

There is currently limited groundwater sampling in the area. There has been no surface water, soil, sediment, or air testing performed. Potential exposure pathways may be identified when additional groundwater data become available and other media are addressed. Conjecture and site observation indicate groundwater is the dominant pathway of contamination, but other pathways cannot be overlooked. A detailed Sampling Analysis Plan (SAP) will answer these questions in the Plan II RI/FS. Currently, other possible exposure pathways cannot be discussed because of the data gaps.

PUBLIC HEALTH IMPLICATIONS

A. Toxicologic Evaluation

Introduction

In this section, we will discuss the health effects in persons exposed to specific contaminants, evaluate state and local health data bases, and address specific community health concerns. EPA developed Maximum Contaminant Levels (MCLs) for drinking water. Primary MCLs are federal drinking water standards declared under the Safe Drinking Water Act. Generally, an MCL for a toxic chemical represents the allowable lifetime exposure to the contaminant for a 70-kg adult who is assumed to ingest 2 liters of water per day. In addition to health factors, an MCL is required by law to reflect the technological and economic feasibility of removing the contaminant from the water supply. The limit set must be feasible given the best available technology and treatment techniques. EPA's Reference Dose (RfD) is an estimate of the daily exposure to a contaminant over a 70-year period that is unlikely to cause non-cancer adverse health effects. ATSDR has developed Minimal Risk Levels (MRLs) for many contaminants found at hazardous waste sites. MRLs provide an estimate of daily exposure, below which, non-cancer adverse health effects are unlikely to occur.

EPA has developed Cancer Slope Factors for some contaminants that are determined to be or possibly are human carcinogens. The Cancer Slope Factor is used to determine if an exposed person's risk of developing cancer in his lifetime may be increased as a result of that exposure.

As indicated in the Environmental Contamination and Other Hazards section, only six VOCs were analyzed and evaluated. In the following discussion, we are addressing three of these VOCs, which were determined to be contaminants of concern. They are TCE, PCE, and 1,1-DCE.

Trichloroethylene (TCE)

TCE exposure through inhalation, skin contact, and ingestion has occurred to residents through use of contaminated drinking water. No remedial actions have been undertaken at North Penn Area 1 after taking S-9 out of service. Water from NPWA well S-10 is not treated but is blended with water from other wells to meet drinking water standards. There are presently no residential wells used for potable water.

Exposure to residents to TCE has occurred to Souderton Borough residents through use of NPWA water, specifically through contamination of well S-9. Although the duration of the contamination and the maximum concentration of contamination is not known (only an estimated 1 μg/L in well S-9, but 12.2 μg/L at the Granite Knitting Mills well as found during the site investigation), the exposure at the taps should have been less due to blending with other wells that were not found to be contaminated. Future exposure may occur at very low concentrations, and treatment of the water (air strippers or carbon filtration) could be undertaken if levels exceed safe drinking water standards. If people were to drink the maximum amount of TCE detected to date (12.2 μg/L), the MRL would not be exceeded (13). Therefore, no non-cancer adverse health effects are expected to result from the exposure.

Occupational studies of workers exposed to TCE (levels which are much higher than the levels found in the groundwater at the site) have not detected TCE-induced cancer, while some animal studies have shown that TCE can produce lung and liver cancer (13). Animal studies also have shown that TCE can cause leukemia, a cancer of the tissues that form white blood cells. In reviewing the animal studies, the Department of Health and Human Services (DHHS) National Toxicology Program could not find clear evidence that TCE causes cancer in animals. The International Agency for Research on Cancer (IARC), an agency which classifies chemicals for their carcinogenicity, has decided that TCE is not classifiable as to human carcinogenicity. However, EPA classified TCE as a probable human carcinogen based upon some animal studies (13). Currently, EPA is reevaluating the carcinogenicity of TCE. EPA has developed a Cancer Slope Factor for TCE (13). If the maximum level of TCE detected to date were ingested for 70 years, the people exposed would not be at an increased risk of developing cancer.

Tetrachloroethene (PCE)

Exposure to PCE has occurred in the past through use of contaminated water in NPWA well S-9, which was taken out of service. We do not know the highest exposure from the taps of

residences or the time when the first contamination began. However, the concentration at well S-9 during the site investigation was 24.7 μg/L and at the on-site Granite Knitting Mills well was 33.5 μg/L, representing the maximum concentrations. Ingestion of that amount of PCE does not exceed the MRL or the RfD. If people were exposed to those maximum levels, no non-cancer adverse health effects are expected as a result of those exposures.

Animal studies conducted with concentrations much higher than most people are exposed to show that PCE can cause liver and kidney damage and kidney cancer (14). Based on these studies, PCE has been identified as a carcinogen by the Department of Health and Human Services/National Toxicological Program, EPA and the International Agency on Research of Cancer. EPA has developed a Cancer Slope Factor for PCE (14). If people drink water containing the maximum amount of PCE found in the water supplies, those people would be a moderate increased risk of developing cancer as a result of that exposure. However, actual levels to which people are exposed are expected to be much lower. Therefore, there is likely little risk.

1,1-Dichloroethene (DCE)

Exposure to DCE has occurred through use of contaminated well water. The maximum amount of DCE found in well water to date is 9.9 μg/L in the Granite Knitting Mills well. Much lower levels were found in NPWA wells. Exposure to the maximum level detected would not result in a dose that would exceed the MRL (15). Therefore, no non-cancer adverse health effects would be expected to result because of ingesting that level.

Exposure to high levels of DCE in animal studies have caused lung, liver, kidney, heart damage and also have caused nervous system disorders (15). The amount of damage depends on the level and duration of exposure. Exposure by inhalation of DCE appears to be more harmful in animals than expected to occur in humans after exposures to high levels of DCE. An increased risk for cancer has been shown in one study where animals were exposed to high levels of DCE (10-25 ppm). DHHS has not classified DCE with respect to carcinogenicity. IRAC has determined that DCE is not classifiable as to its carcinogenicity to humans. EPA has determined that DCE is a probable human carcinogen. However, no relationship between the occurrence of cancer in humans and occupational exposure to DCE has been demonstrated (15). EPA has developed a Cancer Slope Factor for DCE (15). If the maximum level of DCE (12.2 μg/L in the Granite Knitting Mills well) is ingested for 70 years, the people drinking that amount would be at an increased risk of developing cancer as a result of exposure. However, the maximum levels found to date in the public water supply would result in very little, if any, increased risk for the exposed people.

B. Health Outcome Data Evaluation

The North Penn Area 1 site is located in Souderton Borough, Montgomery County. Twenty-one years of all cause mortality and cancer mortality (total cancer and eight cancer sites) were collected for Souderton Borough (16). The 1979-1989 data were analyzed using Pennsylvania's 1979-1981 mortality experience as a standard and the 1980 Census population for age and sex.

Total deaths (all causes) and total cancer deaths were statistically fewer for the period than for the state as a whole. This is found by comparing observed deaths with expected deaths and calculating a Standard Mortality Ratio (SMR) and using a Poisson table (17). There were 521 observed deaths and 872.9 deaths expected (SMR 0.744) (17). An *expected* death is a statistical term used for measuring mortality among a specified population. Montgomery County also had significantly less all cause mortality for the 1979-1989 period with an SMR of 0.920. However, in contrast, deaths to cancer in Montgomery County were statistically high, with an SMR of 1.129. The individual cancer sites analyzed for Souderton Borough were: (1) buccal cavity and pharynx; (2) digestive system; (3) respiratory system; (4) bone, connective tissue, skin and breast; (5) genitourinary system; (6) other and unspecific sites; (7) leukemia; and (8) other lymphatic and hematopoietic tissues. Digestive cancer was significantly low for the period with 31 observed deaths and 51.2 deaths expected (SMR 0.605). All other cancer sites analyzed were below expectation except cancer of the other lymphatic and hematopoietic tissues which had 9 deaths in the study period with 8.8 deaths expected.

C. Community Health Concerns Evaluation

We have addressed the community concern about health as follows:

Is my health at risk as a result of exposure to contamination in the NPWA water supply?

As noted in the toxicological evaluation, there was exposure to PCE and TCE through the use of water from well S-9, which is now out of service. Although the exact time of initial exposure and duration of exposure are unknown, the duration of exposure at levels of health concern was most likely short. No adverse health effects or discernible increased risk of cancer would be expected at the levels of exposure. The NPWA is sampled regularly and consumers would be alerted if the water was at unsafe levels.

CONCLUSIONS

Based upon the information reviewed, PADOH concludes that this site represents an indeterminate public health hazard. Available data indicate that the North Penn Water Authority (NPWA) has been contaminated with PCE, TCE, and DCE. Limited residential well data indicate private well contamination with TCE, DCE, and PCE. The estimated duration and the levels of exposure to these chemicals are not likely to cause any significant adverse health effects. However, the quality assurance and quality control of the sampling data were inadequate. The hydrogeology of the site and surrounding area has not been determined. Nothing is known at the present time about groundwater flow direction at the site or about the influence of local pumping. There are insufficient data on the vertical and horizontal extent and nature of contamination at the site as well as rates of movement of either groundwater or contaminants. No environmental data exist for surface water, soil, sediment, and air; therefore, possible exposures through contact with these media cannot be evaluated.

RECOMMENDATIONS

Cease/Reduce Exposure Recommendations

As recommended in the 1988 *Preliminary Health Assessment*, conduct a detailed well survey in the area, along with sampling, to determine if anyone is currently ingesting contaminated groundwater at or above health concern levels. Provide alternative water supplies for those residences with water supplies contaminated above health concern levels.

Site Characterization Recommendations

1. Investigate the North Penn Water Authority (NPWA) by determining pump rates, blending of wells and the impact of individual wells on receptor populations.

2. Collect sufficient groundwater samples to define the extent of contamination (horizontal and vertical) in the study area and increase the number of contaminants for testing.

3. Investigate surface water, soil, sediment, and air pathways to determine if there is any public health risk from contact with these environmental media.

Health Activities Recommendation Panel (HARP) Recommendations

The data and information developed in the North Penn Area 1 Public Health Assessment have been evaluated for appropriate follow-up actions. The ATSDR Health Activities Recommendation Panel (HARP) determined that no follow-up public health actions are necessary. ATSDR will reevaluate this site and conduct appropriate public health actions, if new data become available that indicate a need to do so.

PUBLIC HEALTH ACTIONS

The Public Health Action Plan (PHAP) for the North Penn Area 1 site contains a description of actions to be taken by ATSDR and/or the Pennsylvania State Department of Health (PADOH) at and in the vicinity of the site subsequent to the completion of this public health assessment. For those actions already taken at the site, please see the Background section of this public health assessment. The purpose of the PHAP is to ensure that this public health assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included, is a commitment on the part of ATSDR and PADOH to follow-up on this plan to ensure that it is implemented. The public health actions to be implemented by ATSDR and PADOH are as follows:

1. PADOH will review the findings of the North Penn Area 1 Phase II Remedial Investigation Report. This report should better characterize the site by defining the extent of contamination and determining if there is any public health risk from surface water, soil, sediment and air pathways.

2. As other information become available on the status of recommendations made in this public health assessment, ATSDR and PADOH will evaluate that information to determine if conditions have changed at the site and if other follow-up actions are necessary.

ATSDR will reevaluate and expand the Public Health Action Plan when needed. New environmental or toxicological data may determine the need for additional actions at the site.

PREPARERS OF REPORT

Thomas Hartman
Statistician
Pennsylvania Department of Health

Kandiah Sivarajah, Ph.D.
State Toxicologist and Project Director
Pennsylvania Department of Health

ATSDR Regional Representative:

Charles Walters
Public Health Advisor
EPA Region III
Office of Assistant Administrator

ATSDR Technical Project Officer:

Gail D. Godfrey
Technical Project Officer
Remedial Program Branch
Division of Health Assessment and Consultation

1. PADOH will review the findings of the North Penn Area 1 Phase II Remedial Investigation Report. This report should better characterize the site by defining the extent of contamination and determining if there is any public health risk from surface water, soil, sediment and air pathways.

2. As other information become available on the status of recommendations made in this public health assessment, ATSDR and PADOH will evaluate that information to determine if conditions have changed at the site and if other follow-up actions are necessary.

ATSDR will reevaluate and expand the Public Health Action Plan when needed. New environmental or toxicological data may determine the need for additional actions at the site.

PREPARERS OF REPORT

Thomas Hartman
Statistician
Pennsylvania Department of Health

Kandiah Sivarajah, Ph.D.
State Toxicologist and Project Director
Pennsylvania Department of Health

ATSDR Regional Representative:

Charles Walters
Public Health Advisor
EPA Region III
Office of Assistant Administrator

ATSDR Technical Project Officer:

Gail D. Godfrey
Technical Project Officer
Remedial Program Branch
Division of Health Assessment and Consultation

CERTIFICATION

The North Penn Area 1 Public Health Assessment has been prepared by the Pennsylvania Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was initiated.

Technical Project Officer, SPS, RPB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment and concurs with its findings.

Director, DHAC, ATSDR

REFERENCES

1. North Penn Area 1, Phase II RI/FS - Work Plan, Work Assignment No. 03-3LW8.0, Contract No. 68-W8-0090, December, 1989.

2. North Penn Area 1, Phase II RI/FS, Sampling and Analyses Plan, Contract No. 68-W8-0090, October, 1991.

3. 1990 Pennsylvania Industrial Directory, U.S. Department of Commerce, Commonwealth of Pennsylvania.

4. 1990 Municipal Population, Pennsylvania, U.S. Department of Commerce, Bureau of the Census, January, 1991.

5. Summary of General Population Characteristics 1990, Census of Population and Housing, 1990; Summary Tape File 1A, U.S. Department of Commerce, Bureau of the Census, June, 1991.

6. Public Schools, Summary of Enrollments, 1990-1991, Pennsylvania Department of Education, 1991.

7. Public Schools, Elementary Enrollments, 1990-1991, Pennsylvania Department of Education, 1991.

8. Public Schools, Secondary Enrollments, 1990-1991, High School Graduates, 1989-1990, Pennsylvania Department of Education, 1991.

9. Nursing Home Director, State Health Data Center, Pennsylvania Department of Health, December, 1990.

10. Directory of Pennsylvania Hospitals, State Health Data Center, Pennsylvania Department of Health, December, 1990.

11. National Priorities List Sites: Pennsylvania. United States Environmental Protection Agency, Office of Emergency and Remedial Response, Office of Program Managements, Washington, D.C. 20460. EPA/540/4-90/038, September, 1990.

12. Telephone Conversation with Patrick M. McManus, Regional Program Manager, Environmental Protection Agency, Region III, December, 1991.

13. Agency for Toxic Substances and Disease Registry, Toxicological Profile for Trichloroethene, U.S. Public Health Service, Atlanta, Georgia, October, 1989.

14. Agency for Toxic Substances and Disease Registry, Toxicological Profile for Tetrachloroethene, U.S. Public Health Service, Atlanta, Georgia, January, 1990.

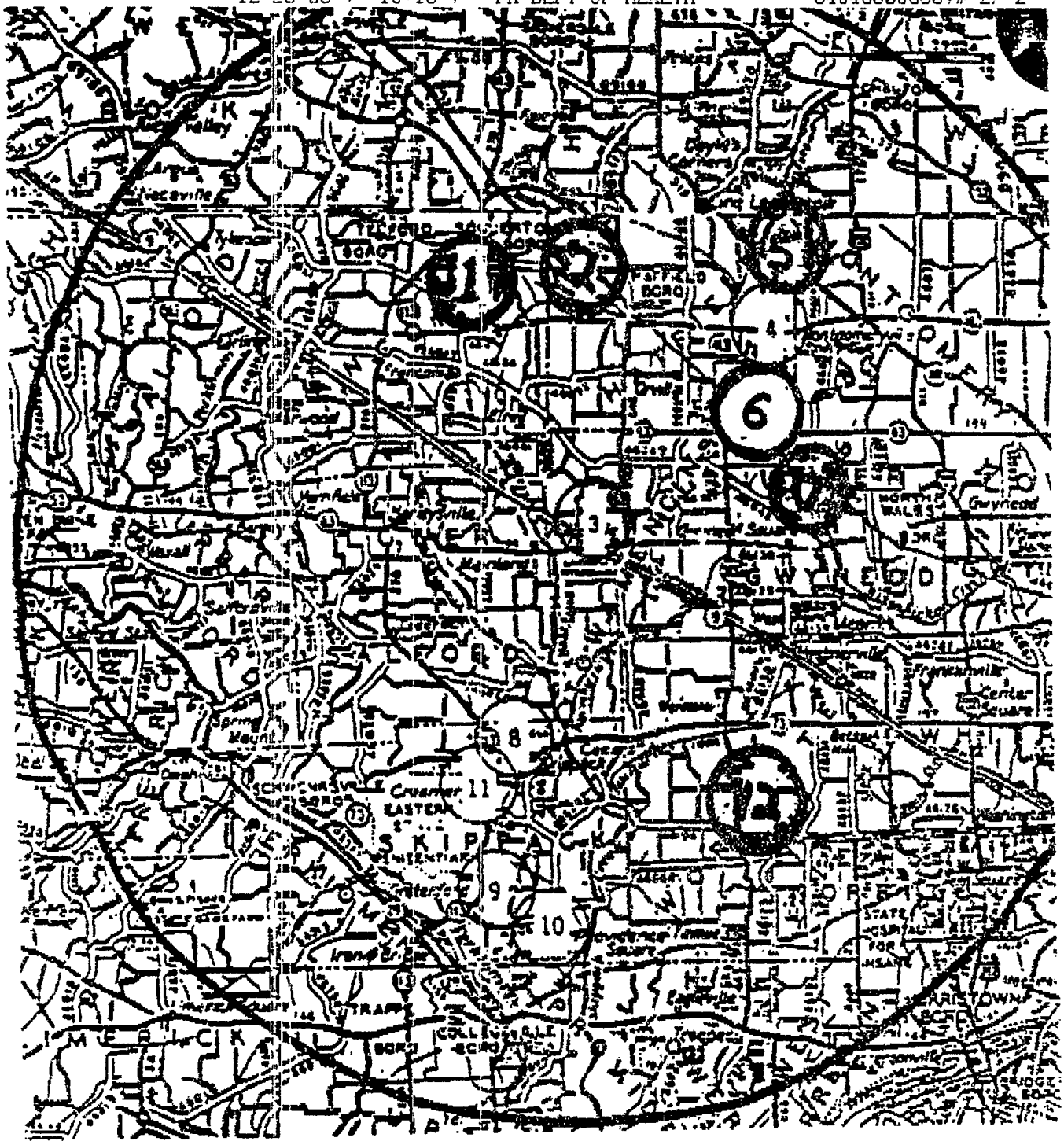
15. Agency for Toxic Substances and Disease Registry, Toxicological Profile for 1,1-Dichloroethene, U.S. Public Health Service, Atlanta, Georgia, December, 1989.

16. Pennsylvania Vital Statistics File, State Health Data Center, Pennsylvania Department of Health, 1991.

17. Bailor J.C. III, Ederer F. Significance Factors for the Ratio of a Poisson Variable to its Expectation, Biometrics; 20:639-643, 1964.

APPENDIX A.

FIGURES



SITE LOCATION MAP WITH AREAS OF CONTAMINATION

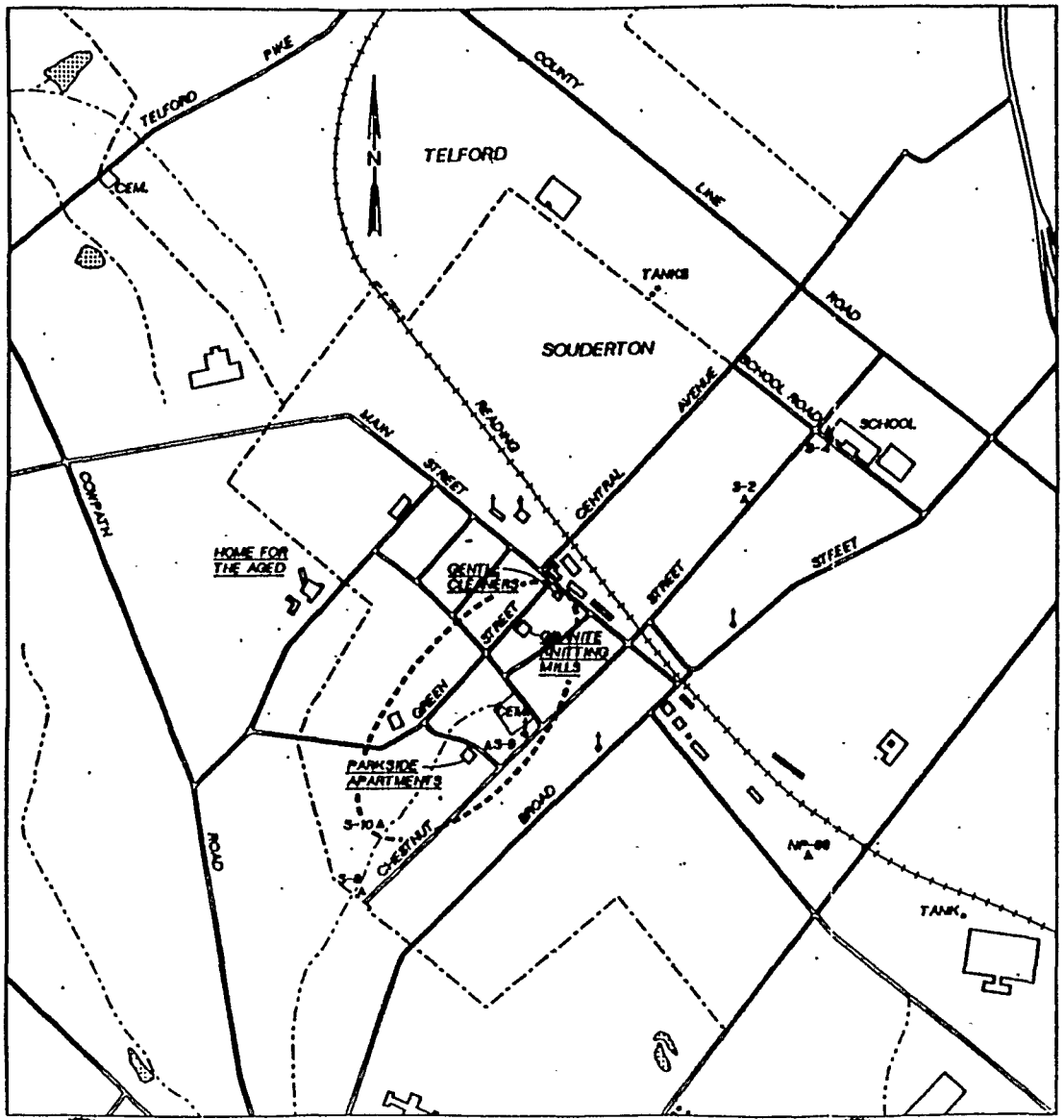
approximate scale
1" = 2.25 miles

LARGE fs - Indicates North Penn Area NPL site

NUS CORPORAT
A Halliburton Com

FIGURE 1

AR301316



LEGEND

- ▲ S-2 — NPWA WELL
- BOROUGH AND TOWNSHIP BOUNDARIES
- PRELIMINARY BOUNDARY OF AREA 1 (NUS, 1986a)

0 800 1000 1500

SCALE: 1" = 1000'

MAP OF AREA 1
North Penn Area 1
Phase II RI/FS

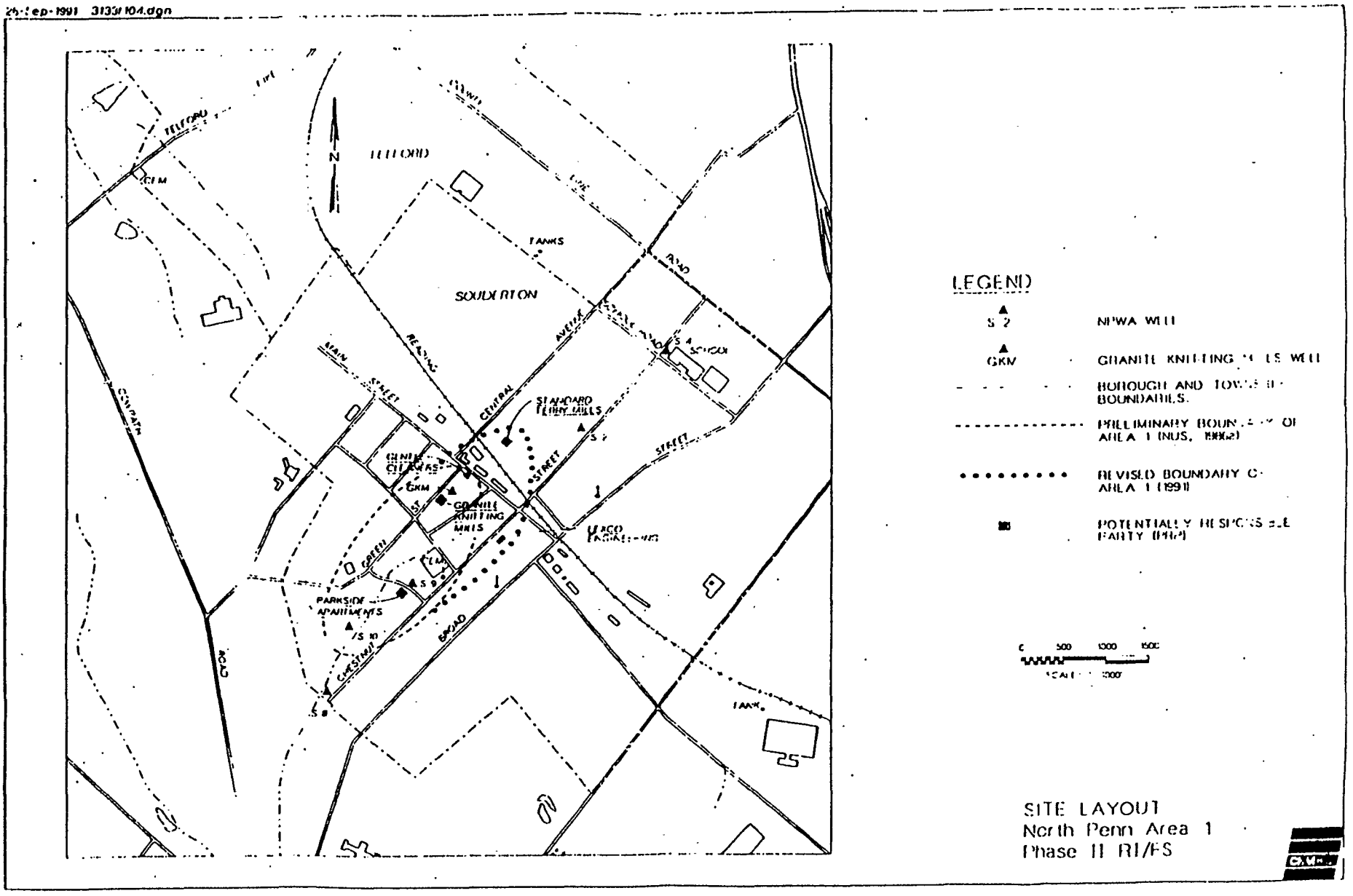
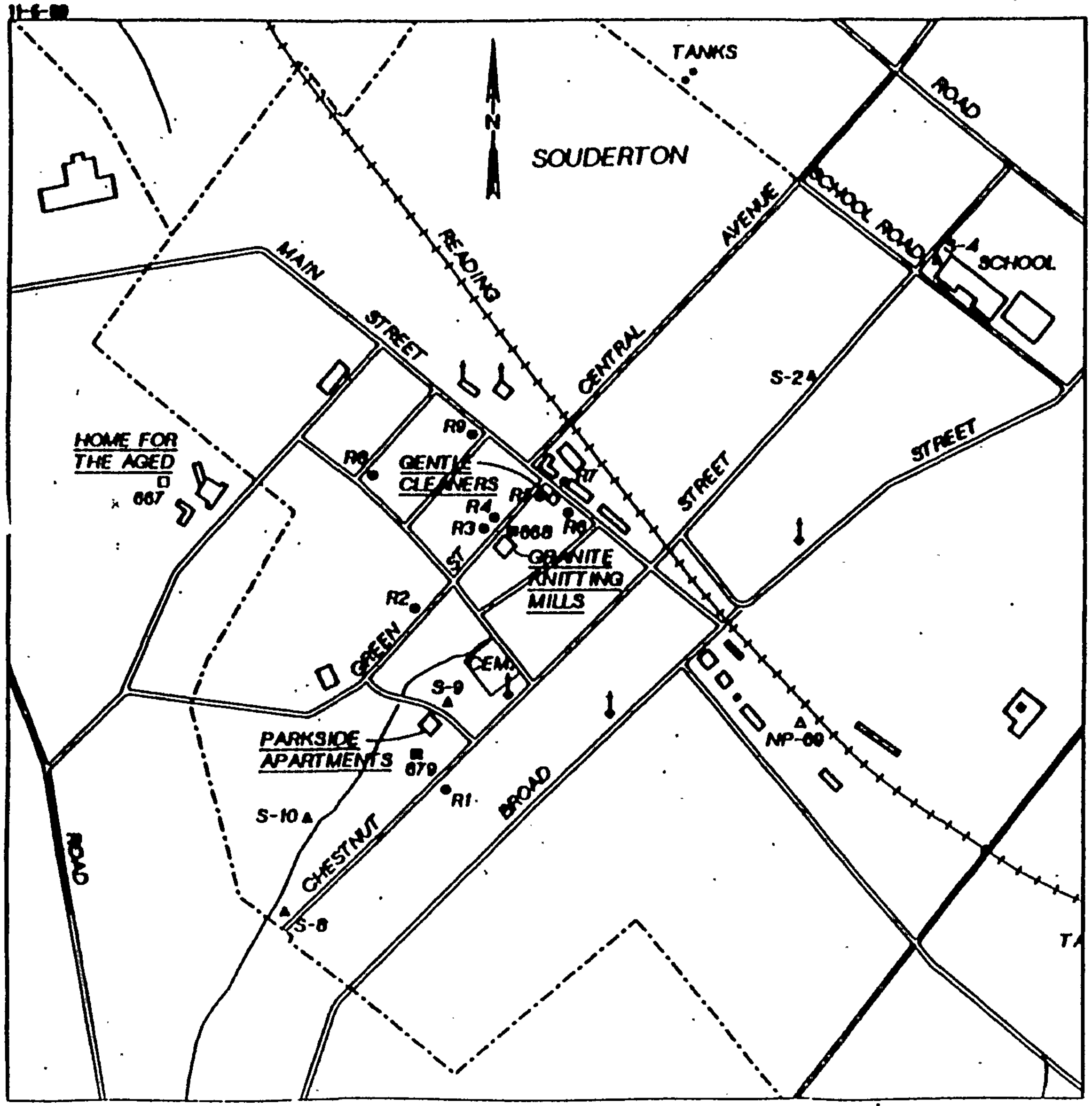


FIGURE 3
28

AR301318



LEGEND

R1 ●		RESIDENTIAL WELL
S-2 ▲ NP-69 △	}	NPWA PRODUCTION WELLS
668 ■ 667 □	}	WELL WITH DESIGNATION FROM NEWPORT (1979)

(SYMBOL IS OPEN IF NO SAMPLING DATA ARE AVAILABLE)

-·-·-·-·- BOROUGH AND TOWNSHIP BOUNDARIES

0 350 700 1050
SCALE: 1"=700'

EXISTING WELL LOCATIONS
North Penn Area 1
Phase II RI/FS